

DEVELOPING INSTRUMENTS AND SOFTWARE FOR MEASURING THE LECTURERS' AND STUDENTS' DIGITAL SKILLS

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Abstract

The government expects higher education in Indonesia to play an important role in developing competent, professional and skilled human resources to meet the needs of industry and society in the 21st century. E-learning is considered the most appropriate solution for the government's future efforts. However, the benefits of e-learning can only be obtained if lecturers (as course developers) and students (as users) have the necessary digital skills (KD) and use them appropriately. Currently, in the world, including in Indonesia of course, there is no standard instrument that can be used to determine digital skills indicators according to UNESCO's Digital Literacy Global Framework (UNESCO, 2019). According to UNESCO, the two constructs that need to be measured to determine a person's KD are Collecting and Managing Information and Producing and Exchanging Information with three and four aspects respectively. In addition, so that the results are valid and reliable, it is recommended that measurements should be administered in three different ways on the same individual, namely Performance Assessment, Knowledge-Based Assessment, and Self-Assessment. This research focuses on creating a KD instrument to measure the KD of lecturers and students using three different methods for the same individual. From the results of research using the unpaired t test or its alternative and profile analysis, it is known that the KD of lecturers and students is significantly different in Knowledge Based Assessment but not for the others. From the results of this research, it is also known that differences in KD are largely determined by the demographic factors involved in this research.

Keywords: *digital skills, e-learning, assessment.*

1 INTRODUCTION

The very rapid development of technology is in line with the increasing dependence of human life on technology, especially internet-based information and communication technology (ICT) and digital communication. The internet has become a part of modern human life. There are many benefits that can be obtained from the internet for teaching and learning activities, work, social activities, getting various information, and so on. However, these benefits can only be obtained if each individual user has the necessary digital skills (KD) and uses them appropriately. In particular, in online learning at the KD level, lecturers and students are important.

KD is a relatively new concept that is related to allied concepts such as literacy or competence in ICT, media, information users and computers. Allmann, et.all (2021) said that Ferari was one of the first researchers to define the relationship between the KD concept and other concepts. He stated that "Digital skills are the ability to access, manage, understand, integrate, communicate, evaluate and create information safely and appropriately through digital technology for work." Currently, there is no standard instrument that can be used to determine digital skills indicators according to UNESCO's Digital Literacy Global Framework (UNESCO, 2019). Furthermore, UNESCO analyzed existing instruments from various research reports originating from a number of countries. In its final report, UNESCO provides recommendations on what constructs need to be known and models or ways to measure KD.

UNESCO defines digital skills as an individual's ability to use digital devices and communication applications to access and manage information. The process that leads to the final goal utilizes technology satisfactorily for a specific purpose (Kačínová, 2019). Digital skills as an important phase in the use of digital technology. The level of digital skills is one of the main factors related to the use of digital media (another main factor is motivation). People need sufficient motivation to acquire digital media and, subsequently, motivation to learn the skills to use them. Only after performing these skills can they benefit from the use of digital media (Van Deursen & Van Dijk, 2014).

Referring to UNESCO recommendations, this research is aimed at developing an instrument that can be used to measure the KD of lecturers and students in Indonesia. In general, there are two constructs that they need to have, namely Collecting and Managing Information and Producing and Exchanging Information. Each construct has 3 or 4 aspects that need to be assessed. While the measuring model, each of these constructs is recommended to be assessed using three instruments; Performance Assessment, Knowledge-Based Assessment, and Self-Assessment. This article will focus on the design and analysis of KD instruments for lecturers and students in the three assessment parts.

2 METHODOLOGY

In this research, a quantitative research approach was used with a survey method. All questionnaire indicators in the survey were designed through the process of creating standardized question indicators in scientific research that fulfill the aspects of purposiveness,

testability, replicability, precision and confidence, objectivity, generalizability, and parsimony principle (Sekaran: 2019).

The population in this research is an infinite population in the form of a population of lecturers and students who are willing to fill out questionnaires distributed through various social media platforms. The number of samples collected was 283. The sampling technique used was saturated sampling or all members of the population who met the criteria, in this case willing to become respondents and fill out questionnaires during the entire data collection period, were used as research sample units.

The important process in this research starts from creating question indicators, constructs so that they become a set of questions for three types of assessment, then analyzing the validity and reliability of the instrument using Biserial correlation/biserial points and KR-21, collecting and processing data using independent t test and profile analysis and interpretation of all findings in the survey.

3 FINDINGS AND DISCUSSION

1.1 Demographic of Responden

The first stage of the data processing process is through screening, coding, and master table processing. The second stage is to conduct data exploration (EDA/exploratory Data Analysis) on respondents' demographic data based on age, gender, length of time as a student (in semesters) and length of time as a lecturer (in years) and their educational background.

Table 1. Age and Length Occupation of Responden

Variable	Group	Mean	Median	Std.	Minimum	Maximum
				Deviation		
Age	Student	18.65	18.00	1.70	17.00	38.00
	Lecture	48.14	51.00	10.26	30.00	63.00
Length_Occupation	Student	1.88	1.00	1.33	1.00	9.00
	Lecture	12.93	11.50	11.12	1.00	35.00

Based on table 1 above, it can be seen that in terms of age, the average age of students is 18.65 years and lecturers are 48.14 years. This is very normal and common, although if you look deeper there are students who are close to 30 years old, this is because they come from distance learning at the Open University. Meanwhile, if we look at the length of work, for students we get 1.88 semesters, meaning that on average the students involved in this research are in the

second semester, even though in fact not all are in the second semester because this measure is a measure of data concentration. Meanwhile, for lecturers, the average length of time they have been a lecturer is 12.93 years. This measure is a measure that states that the lecturers who participated in this research have been categorized as senior lecturers in terms of work experience.

Table 2 Sex and Educational Background

Variable	Student (n(%))	Lecture (n(%))
Sex		
Female	142 (52,8)	7 (50)
Male	127 (47,2)	7 (50)
Educational Background		
High School	238 (88,5)	0 (0,00)
S1	30 (11,2)	0 (0,00)
S2	1 (0,4)	10 (71,4)
S3	0 (0,00)	4 (28,6)

From table 2 above, it can be seen that the distribution of gender can be said to be evenly distributed between students and lecturers, while for educational level it is very clear that the students involved are predominantly undergraduate students so their last education is high school, and only a small number are 11. 2% of these students are Masters students and only 1 is a Doctoral student. Meanwhile, for lecturers, the educational background for Masters is 71.4% and for Doctoral degrees it is 28.6%. If you look at the relationship between each demographic variable and the type of assessment for students and lectures, it can be seen from the results of the chisquare test below

Tabel 3. Association between Demography vs type of Asessment

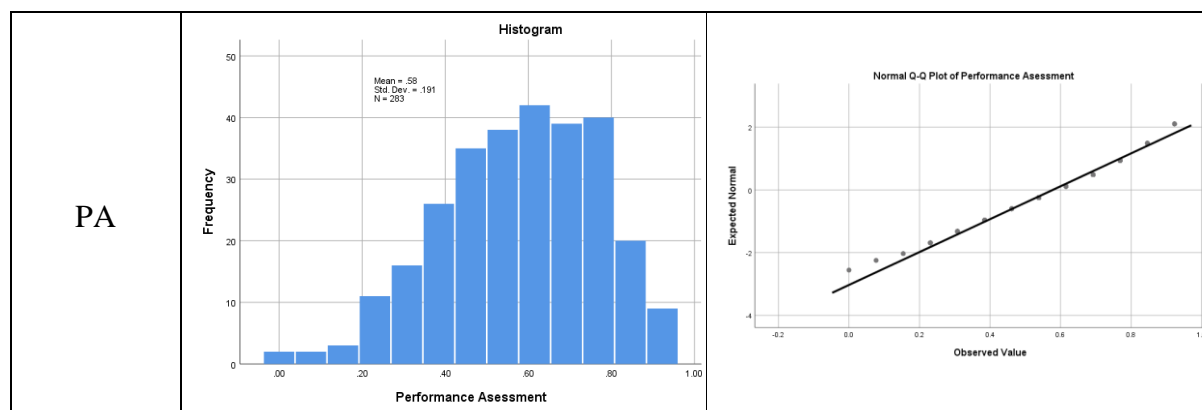
	KBA		SA		PA	
	Student	Lecture	Student	Lecture	Student	Lecture
Sex	0,424	0,701	0,532	0,540	0,136	0,333
Education	0,273	0,382	0,000	0,344	0,359	0,308
Online Class	0,754	0,371	0,000	0,338	0,000	0,330
Online Class Int	0,965	0,487	0,004	0,487	0,030	0,729

1.2 Data Analytic Result

The research data that is focused on are the three types of assessments, namely KBA (Knowledge Based Assessment), SA (Self Assessment), and PA (Performance Assessment) which are processed based on the sequence in which data processing has been planned. The most important stage in data analysis is testing the normality of the data for the three types of assessment above. The following are the results of the data normality test using the analytical method with the Shapiro Wilk test and the visual method using QQ plot and Histogram, In table 4 below are the visual test results using histograms and QQ plots

Table 4 Visual Normality Test

Assessment	Histogram	QQ plot
KBA		
SA		



Based on the results of the normality test, it can be seen visually that the histograms for the three assessments above are not perfectly symmetrical, only the KBA has a symmetrical shape that is relatively the same as the normally distributed data. Meanwhile, if seen based on the QQ plot, the three types of assessment above can be said to have a normal distribution. Visual testing has been abandoned by many groups because there is still an element of subjectivity in assessing normality test results. As an alternative to testing data normality, data normality testing is used using analytical methods, namely using the Kolmogorov Smirnov test if the sample size is large ($n > 50$) or the Shapiro Wilk test if the sample size is small ($n \leq 50$). Table 4 below explains the analytical test results.

Table 5. Analytic Normality Testing

	Tests of Normality					
	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Knowledge Based Assessment	.162	283	.000	.957	283	.000
Self Assessment	.116	283	.000	.977	283	.000
Performance Assessment	.108	283	.000	.969	283	.000

a. Lilliefors Significance Correction

From table 5 above, it can be seen that based on the Kolmogorov Smirnov test (this test is a reference because the sample size is > 50), a sig value < 0.001 is obtained which states that the data distribution is not normally distributed. This can happen because the initial source data is binary data with code 1 = correct answer and 0 = incorrect answer. Based on these results, the data analysis that will be carried out includes non-parametric data analysis. The results of data

processing using profile analysis using LSD (Least Square Difference) can be seen in the graph below

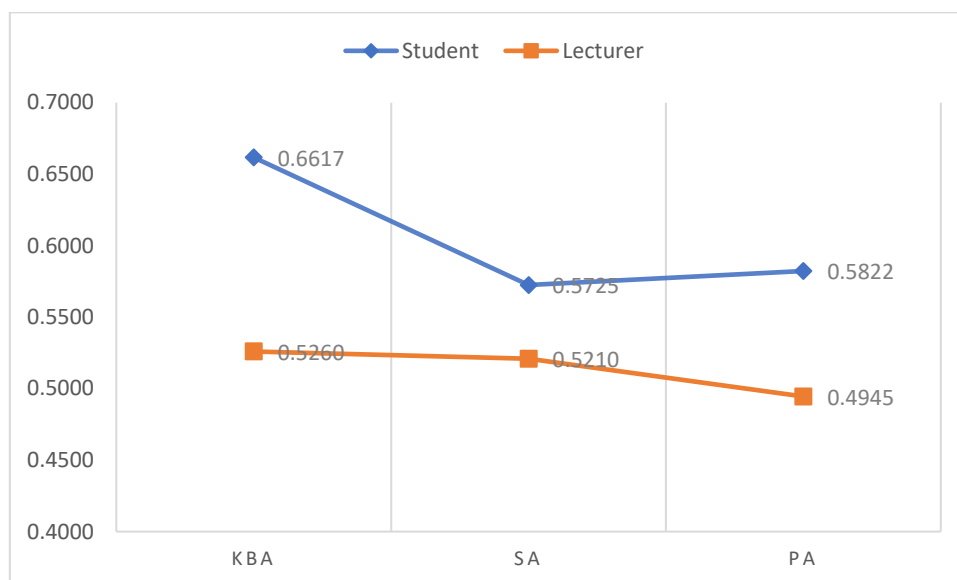


Figure 1. Profile of Assesment Type

From Figure 1 above, it can be seen that all types of tests, namely KBA, SA and PA, for students have higher scores than for lecturers. A very big difference occurs in the types of KBA, PA tests and the smallest difference is SA. Based on the results of testing with LSD, it was found that the only significant differences were in KBA, while in SA and PA, although there were differences, the differences were not significant. Complete results from testing with Pairwise comparison with LSD can be seen in the table below

Pairwise Comparisons

Dependent Variable	(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig. ^b	95% Confidence Interval for Difference ^b	
						Lower Bound	Upper Bound
Knowledge Based Assessment	Mahasiswa	Dosen	.136*	.044	.002	.048	.223
	Dosen	Mahasiswa	-.136*	.044	.002	-.223	-.048
Self Assessment	Mahasiswa	Dosen	.051	.046	.261	-.039	.142
	Dosen	Mahasiswa	-.051	.046	.261	-.142	.039
Performance Assessment	Mahasiswa	Dosen	.088	.052	.093	-.015	.190
	Dosen	Mahasiswa	-.088	.052	.093	-.190	.015

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

From the table above you can see the treatment pairs that will be tested using LSD. It can be seen from the sig column, only the treatment in the KBA assessment type produces a sig value <0.05. This is in line with the results of testing using the Mann-Whitney test (a substitute for the independent t test because the data is not normally distributed), which states the same conclusion that only KBA has a significant difference between lecturers and students.

Based on the results of demographic data processing and the Mann Whitney test and LSD Pairwise comparison, it can be concluded that the types of tests applied to students and lecturers have different results, especially in the KBA assessment type. This type of KBA test is more focused on the knowledge side of the object being tested.

Tabel 6. Non Parametrik Test type of Aesessment among group sample (student and Lecture)

	Test Statistics ^a		
	Knowledge Based Assessment	Self Assessment	Performance Assessment
Mann-Whitney U	1268.000	1787.500	1603.500
Wilcoxon W	1373.000	1892.500	1708.500
Z	-2.097	-.322	-.943
Asymp. Sig. (2-tailed)	.036	.747	.346

a. Grouping Variable: Group

4 CONCLUSION

Based on the results of this research, it can be concluded that based on the development stage of the Digital Skills Instrument for students and lecturers using three types of tests, namely Knowledge Based Assessment, Self Assessment and Performance Assessment, the results obtained are that Self Assessment and Performance Assessment even though students have higher scores than The lecturer found that the difference in results was not significant based on the Pairwise Comparison LSD test and the Mann Whitney test. Only Knowledge based Assessment has significantly different results.

This is an interesting finding that even though in terms of knowledge content, lecturers have a stronger knowledge structure than students, it turns out that in terms of skills, this is inversely

proportional. Likewise with other types of assessment, namely Self assessment and Performance assessment. This is an initial finding so that in the future more thorough sample inclusion criteria are needed for the groups that will be compared both in terms of number and criteria of the sample units, for example lecturers and students in different fields such as lecturers in exact/technology, economics and arts. So the resulting profile analysis will be more varied and better conclusions will be obtained.

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